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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/961,248	09/25/2001	Hidetaka Hattori	214391US2S	7284

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EXAMINER	
FARAHANI, DANA	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 10/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/961,248	Applicant(s) HATTORI, HIDETAKA	
	Examiner Dana Farahani	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 1- 3, 5, 11-13, 15, 21- 23, 25, 31-33, and 35, are rejected under 35 U.S.C. 102(b) as being anticipated by the Japanese patent issued to Hiramoto et al. (Document ID# 362126668A), hereinafter the Japanese patent, newly cited.

Regarding claims 1, 11, 21, and 31, the Japanese patent discloses in figure 3, a power semiconductor device comprising a base layer 6 of a first conductivity type; a base layer 5 of a second conductivity type selectively formed on one surface of the base layer of the first conductivity type; an emitter/source layer 4 of the first conductivity type selectively formed on the surface of the base layer of the second conductivity type; a collector/drain layer 7 selectively formed on one of the one surface and another surface of the base layer of the first conductivity type; a first main electrode 8 formed on the collector layer; a second main electrode 1 formed on the emitter layer and on the base layer of the second conductivity type; a gate insulating film 3 of figure 1 formed on a surface of the base layer of the second conductivity type that lies between the emitter layer and the base layer of the first conductivity type, the gate insulating film including a first insulating portion and a second insulating portion; and a gate electrode G formed above the first and second insulating portions, wherein a capacitance of a capacitor

formed of the second insulating portion is smaller than a capacitance of a capacitor formed of the first insulating portion.

Regarding claims 2, 5, 12, 15, 22, 25, 32, and 35, the first insulating portion is formed near emitter (at the end portion) and the second insulating portion is formed in a portion near the base layer.

Regarding claims 3, 13, 23, and 33, the thickness of the second insulting portion is larger than that of the first insulating portion.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 4, 14, 24, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese patent, as applied to claims 1-3 above, and further in view of Lee (U.S. Patent 6,291,865), newly cited.

The Japanese patent discloses the claimed invention, as discussed above, except for expressly disclosing different dielectric constants for the gate insulator.

Lee discloses in figure 2b a transistor, in which the gate dielectric comprises different dielectric sections. This configuration, reduces short channel effect and improve characteristics of the device (see column 2, lines 39-44). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use to

different gate insulating portions in the Japanese patent in order to reduce the short channel effect and improve the characteristics of the transistor.

5. Claims 6-10, 16-20, 26- 30, and 36-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese patent, as applied to claim 1 above, and further in view of Takeuchi et al., hereinafter Takeuchi (U.S. Patent 6,262,439), newly cited.

The Japanese patent discloses the claimed invention, as discussed above, except for the gates being in a trench.

Takeuchi discloses in figure 2 a trench gate structure (7 and 8) for a MOSFET device. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a trench gate structure in the Japanese patent, since it is known in the art that trench gate structures in MOS transistors take less space on the semiconductor chip.

Response to Arguments

6. Applicant's arguments filed on 2/27/03 with respect to claims 1-40 have been fully considered and are persuasive. The previous rejections of those claims have been withdrawn, and new grounds of rejection are presented in this Office Action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dana Farahani whose telephone number is (703)305-1914. The examiner can normally be reached on M-F 9:00AM - 6:00PM, Est. time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on (703)308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9319 for regular communications and (703)305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Dana Farahani
April 10, 2003

LONG PHAM
PRIMARY EXAMINER